

WHAT IS CLAIMED IS:

1. A peer-to-peer network, comprising:

5 a plurality of peer nodes, wherein each peer node comprises a network node
configured to communicate with one or more other ones of said peer nodes
over the peer-to-peer network, wherein the plurality of peer nodes are
configured to implement a peer-to-peer environment on the network
according to a peer-to-peer platform comprising a core layer comprising
10 one or more peer-to-peer platform protocols for enabling the plurality of
peer nodes to discover each other, communicate with each other, and
cooperate with each other to form peer groups and share network resources
in the peer-to-peer environment;

15 one or more rendezvous nodes, wherein each rendezvous node is operable to
cache one or more resource advertisements for discovery by the peer nodes
on the peer-to-peer network, wherein each resource advertisement
comprises an indication of how to access a corresponding network
resource, wherein the one or more peer-to-peer platform protocols include
20 a discovery protocol, wherein said one or more resource advertisements
are formatted in accordance with the peer-to-peer platform discovery
protocol.

25 2. The peer-to-peer network as recited in claim 1, wherein the rendezvous nodes
are peer nodes.

3. The peer-to-peer network as recited in claim 1, wherein each resource
advertisement comprises an identifier for and communication address for the
corresponding network resource.

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4. The peer-to-peer network as recited in claim 1, wherein each of the one or more of said resource advertisements comprises a security credential for authenticating the corresponding network resource.

5 5. The peer-to-peer network as recited in claim 1, wherein the network resources include one or more of the peer groups, the peer nodes, services, applications, content, pipes and pipe endpoints, wherein the pipes are communications channels between one or more of the peer nodes, the services and the applications in the peer-to-peer environment, wherein the pipe endpoints are network interfaces on the peer nodes that are configured to
10 be bound to the pipes to establish the communications channels.

 6. The peer-to-peer network as recited in claim 1, wherein the network resources include the peer groups, wherein each peer group comprises one or more of the peer nodes, wherein the resource advertisements include a peer group advertisement for each
15 of said one or more peer groups, wherein each peer group advertisement further comprises an identifier for the corresponding peer group and information on how to join the peer group.

 7. The peer-to-peer network as recited in claim 1, wherein the network resources
20 include one or more of the peer nodes, wherein the resource advertisements comprise a peer advertisement for each of said one or more peer nodes, wherein each peer advertisement comprises an identifier for the corresponding peer node.

 8. The peer-to-peer network as recited in claim 1, wherein the network resources
25 include one or more services each provided by one or more of the peer nodes, wherein the resource advertisements comprise a service advertisement for each of said plurality of services, wherein each service advertisement comprises an identifier for the corresponding service.

9. The peer-to-peer network as recited in claim 1, wherein the network resources include a plurality of applications each provided by one or more of the peer nodes, wherein the resource advertisements comprise an application advertisement for each of said applications, wherein each application advertisement comprises an identifier for the
5 corresponding application.

10. The peer-to-peer network as recited in claim 1, wherein the network resources include one or more contents provided by one or more of the peer nodes, wherein the resource advertisements comprise a content advertisement for each of said contents,
10 wherein each content advertisement comprises an identifier for the corresponding content.

11. The peer-to-peer network as recited in claim 1, wherein the network resources include one or more pipes, wherein the one or more pipes are communications channels between one or more of the peer nodes, services and applications in the peer-to-peer
15 environment, wherein the resource advertisements comprise a pipe advertisement for each of said one or more pipes, wherein each pipe advertisement comprises an identifier for the corresponding pipe.

12. The peer-to-peer network as recited in claim 1, wherein the network resources
20 include one or more pipe endpoints, wherein the pipe endpoints are network interfaces on the peer nodes that are configured to be bound to the pipes to establish the communications channels, wherein the resource advertisements comprise an endpoint advertisement for each of said one or more pipe endpoints, wherein each endpoint advertisement comprises an identifier for the corresponding pipe endpoint.

13. The peer-to-peer network as recited in claim 1, further comprising an advertisement for each of the one or more rendezvous nodes, wherein the advertisement for each of the one or more rendezvous nodes includes information describing how to connect to and communicate with the particular rendezvous node, wherein each
30 rendezvous node is operable to cache one or more of said advertisements for the one or

more rendezvous nodes, wherein said advertisements for the one or more rendezvous nodes cached on the rendezvous nodes are discoverable by said peer nodes on the peer-to-peer network.

5 14. The peer-to-peer network as recited in claim 1, wherein the one or more resource advertisements each comprise a time-to-live indicator, wherein each of the one or more rendezvous nodes is further operable to:

decrement the time-to-live indicator comprised by each of the one or more
10 resource advertisement cached by the particular rendezvous node; and

if the time-to-live indicator expires, delete or invalidate the particular cached
resource advertisement.

15 15. The peer-to-peer network as recited in claim 1, wherein at least a subset of the peer groups comprise:

one or more of the rendezvous nodes; and

20 one or more of the plurality of peer nodes;

wherein the rendezvous nodes within the peer group are accessible by the one or
more peer nodes and the other rendezvous nodes within the peer group to
discover network resources within the peer group.

25 16. The peer-to-peer network as recited in claim 15, wherein the rendezvous nodes within the peer group are not accessible by peer nodes not in the peer group and rendezvous nodes not in the peer group.

17. The peer-to-peer network as recited in claim 1, wherein the each of the one or more rendezvous nodes is operable to discover routes to network resources and communicate said routes to one or more of the plurality of peer nodes.

5 18. The peer-to-peer network as recited in claim 1, wherein one or more of the plurality of peer nodes is each operable to communicate with at least one of the one or more rendezvous nodes at startup of the particular peer node to discover network resources that the particular peer node requires.

10 19. The peer-to-peer network as recited in claim 1, wherein each of the plurality of peers is operable to broadcast discovery queries to discover said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol.

15 20. The peer-to-peer network as recited in claim 1, wherein each of the one or more rendezvous nodes is operable to:

 receive one or more discovery queries for discovering said network resources,
 wherein the discovery queries are formatted in accordance with the
 discovery protocol;

20 determine if a resource advertisement satisfying a particular one of the one or more discovery queries is cached on the particular rendezvous node; and

 if the resource advertisement satisfying the particular discovery query is cached on
25 the particular rendezvous node, provide the resource advertisement to one
 of the plurality of peer nodes that broadcast the particular discovery query.

21. The peer-to-peer network as recited in claim 20, wherein each of the one or more rendezvous nodes is further operable to forward the discovery query to one or more

other rendezvous nodes if the resource advertisement satisfying the discovery query is not cached on the particular rendezvous node.

22. The peer-to-peer network as recited in claim 1, wherein each of the plurality
5 of peer nodes is operable to:

receive one or more discovery queries for discovering said network resources,
wherein the discovery queries are formatted in accordance with the
discovery protocol;

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respond to a particular one of the one or more discovery queries if the particular
peer node includes the resource advertisement satisfying the particular
discovery query.

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23. The peer-to-peer network as recited in claim 22, wherein each of the plurality
of peer nodes is further operable to forward the particular discovery query to one or more
other peer nodes of the plurality of peer nodes if the particular peer node does not include
the resource advertisement satisfying the particular discovery query.

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24. The peer-to-peer network as recited in claim 22, wherein each of the plurality
of peer nodes is further operable to forward the particular discovery query to one or more
of the rendezvous nodes if the particular peer node does not include the resource
advertisement satisfying the particular discovery query.

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25. The peer-to-peer network as recited in claim 22, wherein each of the plurality
of peer nodes does not forward the particular discovery query to one or more of the
rendezvous nodes if the particular peer node does not include the resource advertisement
satisfying the particular discovery query.

26. The peer-to-peer network as recited in claim 22, wherein each of the plurality of peer nodes is further operable to forward the particular discovery query to one or more other peer nodes of the plurality of peer nodes.

5 27. The peer-to-peer network as recited in claim 22, wherein each of the one or more rendezvous nodes is further operable to forward the discovery query to one or more other rendezvous nodes if the resource advertisement satisfying the discovery query is not cached on the particular rendezvous node.

10 28. The peer-to-peer network as recited in claim 1, wherein each of the one or more rendezvous nodes is operable to:

 receive a discovery query for discovering a particular one of said network
 resources, wherein the discovery query is formatted in accordance with the
15 discovery protocol; and

 propagate the discovery query to a subset of the one or more rendezvous nodes.

20 29. The peer-to-peer network as recited in claim 28, wherein one or more of the subset of the one or more rendezvous nodes are operable to propagate the discovery query to another subset of the one or more rendezvous nodes.

25 30. The peer-to-peer network as recited in claim 28, wherein the rendezvous peers are further operable to limit propagation of the discovery query using a time-to-live indicator included in the discovery query.

 31. The peer-to-peer network as recited in claim 1, wherein one or more of said peer nodes are operable to:

send a discovery query message specifying a desired type of advertisement to one or more of the rendezvous nodes, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol; and

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receive one or more response messages comprising one or more advertisements from one or more of the rendezvous nodes in response to said discovery query message, wherein each response message is formatted in accordance with the peer-to-peer platform discovery protocol.

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32. The peer-to-peer network as recited in claim 28, wherein the discovery query message comprises a time-to-live indicator decremented by the one or more rendezvous nodes receiving the discovery query message, wherein rendezvous nodes are further operable to delete or invalidate the discovery query message if the time-to-live indicator expires.

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33. The peer-to-peer network as recited in claim 28, wherein the discovery query message comprises a security credential, wherein the rendezvous nodes are operable to use the security credential to authenticate the sending peer node.

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34. The peer-to-peer network as recited in claim 28, wherein the discovery query message specifies advertisements for network resources within a particular region of the network.

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35. The peer-to-peer network as recited in claim 1, wherein each of the one or more rendezvous nodes are operable to:

receive a discovery query message from one of the plurality of peer nodes specifying a desired type of advertisement, wherein the discovery query

message is formatted in accordance with the peer-to-peer platform discovery protocol;

5 locate one or more advertisements of the desired type of advertisements that are
cached on the rendezvous node; and

10 send a response message comprising the one or more advertisements to the peer
node in response to said discovery query message, wherein the response
message is formatted in accordance with the peer-to-peer platform
discovery protocol.

36. The peer-to-peer network as recited in claim 1, wherein each of the one or more rendezvous nodes are operable to:

15 receive a discovery query message from a peer node of the plurality of peer nodes
specifying a desired type of advertisement, wherein the discovery query
message is formatted in accordance with a peer-to-peer platform discovery
protocol; and

20 forward the discovery query message to one or more other rendezvous nodes.

37. The peer-to-peer network as recited in claim 36, wherein each of the one or more other rendezvous nodes are operable to:

25 receive the forwarded discovery query message;

 locate one or more advertisements of the desired type of advertisement that are
cached on the rendezvous node; and

send a response message comprising the one or more advertisements to the peer node in response to the forwarded discovery query message, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol.

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38. The peer-to-peer network as recited in claim 36, wherein each of the one or more other rendezvous nodes are operable to:

receive the forwarded discovery query message; and

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forward the discovery query message to one or more other rendezvous nodes.

39. The peer-to-peer network as recited in claim 36, wherein each of the one or more rendezvous nodes are operable to:

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receive a response message comprising one or more advertisements from another rendezvous node of the one or more rendezvous nodes, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol; and

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forward the response message to a peer node of the plurality of peer nodes that sent the discovery query message.

40. The peer-to-peer network as recited in claim 39, wherein each of the one or more rendezvous nodes is further operable to cache the advertisements received in the response message for discovery by the plurality of peer nodes.

41. The peer-to-peer network as recited in claim 1, wherein at least a subset of the one or more rendezvous nodes cache advertisements related to a particular area of interest, wherein each of the one or more rendezvous nodes is configured to:

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receive a discovery query from a peer node specifying advertisements related to the particular area of interest;

5 if the particular rendezvous node includes resource advertisements satisfying the received discovery query, send the resource advertisements to the peer node; and

10 forward the received discovery query to rendezvous nodes caching advertisements related to the particular area of interest.

42. The peer-to-peer network as recited in claim 1, wherein the rendezvous nodes are each operable to maintain one or more indexes of the advertisements cached by the rendezvous node.

15 43. The peer-to-peer network as recited in claim 42, wherein the one or more indexes are updatable to reflect changes in the network resources.

20 44. The peer-to-peer network as recited in claim 42, wherein each of the one or more rendezvous nodes is operable to send the one or more indexes to a service in response to a request from the service, wherein the service is operable to use the indexes to discover network resources advertised in the indexes.

25 45. The peer computing network as recited in claim 1, wherein each of the one or more rendezvous nodes are operable to:

receive a lease request message from a peer node of the plurality of peer nodes requesting a temporary communications channel with the particular rendezvous node; and

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send a lease grant message to the peer node in response to the lease request message, wherein the lease grant message includes information on the temporary communications channel.

5 46. The peer computing network as recited in claim 45, wherein each of the one or more rendezvous nodes are operable to:

receive a lease cancel request message from the peer node requesting the cancellation of the temporary communication channel; and

10 send a lease cancelled message to the peer node in response to the lease cancel request message, wherein the lease cancelled message confirms the cancellation of the temporary communication channel.

15 47. The peer computing network as recited in claim 45, wherein each of the one or more rendezvous nodes are operable to:

receive a message from the peer node via the temporary communication channel; and

20 broadcast the message to one or more other peer nodes of the plurality of peer nodes having temporary communications channels with the rendezvous node.

25 48. A rendezvous node, comprising:

a processor;

a port operable to couple the peer node to a network; and

a memory operable to store program instructions, wherein the program instructions are executable by the processor to:

communicate with one or more peer nodes on a peer-to-peer network; and

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cache one or more resource advertisements for network resources, wherein each of said resource advertisements comprises an indication of how to access the corresponding network resource, wherein said resource advertisements are discoverable by said one or more peer nodes.

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49. The rendezvous node as recited in claim 48, wherein the program instructions are further executable to communicate with one or more other rendezvous nodes on the peer-to-peer network.

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50. The rendezvous node as recited in claim 48, wherein the rendezvous node is a peer node.

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51. The rendezvous node as recited in claim 48, wherein each resource advertisement comprises an identifier for and communication address for the corresponding network resource.

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52. The rendezvous node as recited in claim 48, wherein each of the one or more of said resource advertisements comprises a security credential for authenticating the corresponding network resource.

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53. The rendezvous node as recited in claim 48, wherein the network resources include one or more peer groups, wherein the one or more peer groups each comprise one or more peer nodes sharing one or more network resources, one or more peer nodes, services, applications, content, pipes and pipe endpoints, wherein the pipes are communications channels between one or more of the peer nodes, the services and the

applications in the peer-to-peer environment, wherein the pipe endpoints are network interfaces on the peer nodes that are configured to be bound to the pipes to establish the communications channels.

5 54. The rendezvous node as recited in claim 48, wherein the network resources include one or more peer groups, wherein each peer group comprises one or more peer nodes, wherein the resource advertisements include a peer group advertisement for each of said one or more peer groups, wherein each peer group advertisement further comprises an identifier for the corresponding peer group and information on how to join
10 the peer group.

 55. The rendezvous node as recited in claim 48, wherein the network resources include one or more peer nodes, wherein the resource advertisements comprise a peer advertisement for each of said one or more peer nodes, wherein each peer advertisement
15 comprises an identifier for the corresponding peer node.

 56. The rendezvous node as recited in claim 48, wherein the network resources include one or more services each provided by one or more peer nodes, wherein the resource advertisements comprise a service advertisement for each of said plurality of
20 services, wherein each service advertisement comprises an identifier for the corresponding service.

 57. The rendezvous node as recited in claim 48, wherein the network resources include a plurality of applications each provided by one or more peer nodes, wherein the
25 resource advertisements comprise an application advertisement for each of said applications, wherein each application advertisement comprises an identifier for the corresponding application.

 58. The rendezvous node as recited in claim 48, wherein the network resources
30 include one or more contents each provided by one or more peer nodes, wherein the

resource advertisements comprise a content advertisement for each of said contents, wherein each content advertisement comprises an identifier for the corresponding content.

59. The rendezvous node as recited in claim 48, wherein the network resources
5 include one or more pipes, wherein the one or more pipes are communications channels between peer nodes, services and applications, wherein the resource advertisements comprise a pipe advertisement for each of said one or more pipes, wherein each pipe advertisement comprises an identifier for the corresponding pipe.

10 60. The rendezvous node as recited in claim 48, wherein the network resources include one or more pipe endpoints, wherein the pipe endpoints are network interfaces on peer nodes that are configured to be bound to pipes to establish the communications channels, wherein the resource advertisements comprise an endpoint advertisement for each of said one or more pipe endpoints, wherein each endpoint advertisement comprises
15 an identifier for the corresponding pipe endpoint.

61. The rendezvous node as recited in claim 48, wherein the network resources include one or more other rendezvous nodes on the peer-to-peer network, wherein the resource advertisements comprise an advertisement for each of said rendezvous nodes,
20 wherein each advertisement comprises an identifier for the corresponding rendezvous node.

62. The rendezvous node as recited in claim 48, wherein the program instructions are further executable to:

25 generate an advertisement for the rendezvous node; and

communicate said advertisement to peer nodes and other rendezvous nodes on the
peer-to-peer network.

63. The rendezvous node as recited in claim 48, wherein the one or more resource advertisements each comprise a time-to-live indicator, wherein the program instructions are further executable to:

5 decrement the time-to-live indicator comprised by each of the one or more resource advertisement cached by the rendezvous node; and

if the time-to-live indicator expires, delete or invalidate the particular cached resource advertisement.

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64. The rendezvous node as recited in claim 48, wherein the program instructions are further executable to join a peer group, wherein the peer group comprises a plurality of peer nodes sharing network resources, wherein, upon joining the peer group, the rendezvous node is accessible by the one or more peer nodes within the peer group to
15 discover network resources within the peer group.

65. The rendezvous node as recited in claim 64, wherein, upon joining the peer group, the rendezvous node is not accessible by peer nodes not in the peer group.

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66. The rendezvous node as recited in claim 48, wherein the program instructions are further executable to discovery routes to network resources and communicate said routes to one or more peer nodes on the peer-to-peer network.

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67. The rendezvous node as recited in claim 48, wherein the program instructions are further executable to communicate with each of one or more peer nodes on the peer-to-peer network at startup of the particular peer node to aid the particular peer node in discovering network resources that the particular peer node requires.

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68. The rendezvous node as recited in claim 48, wherein the program instructions are further operable to:

receive one or more discovery queries for discovering said network resources,
 wherein the discovery queries are formatted in accordance with a
 discovery protocol;

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determine if a resource advertisement satisfying a particular one of the one or
 more discovery queries is cached on the particular rendezvous node; and

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if the resource advertisement satisfying the particular discovery query is cached on
 the particular rendezvous node, provide the resource advertisement to a
 peer node that broadcast the particular discovery query.

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69. The rendezvous node as recited in claim 68, wherein the program instructions
 are further executable to forward each of the one or more discovery queries to one or
 more other rendezvous nodes on the peer-to-peer network if the resource advertisement
 satisfying the particular discovery query is not cached on the rendezvous node.

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70. The rendezvous node as recited in claim 68, wherein each of the one or more
 discovery queries comprises a time-to-live indicator, wherein the program instructions are
 further executable to:

decrement the time-to-live indicators; and

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if the time-to-live indicator expires, delete or invalidate the particular discovery
 query.

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71. The rendezvous node as recited in claim 68, wherein the discovery queries
 each comprise a security credential, wherein the program instructions are further
 executable to use the security credential to authenticate a peer node sending the particular
 discovery query.

72. The rendezvous node as recited in claim 68, wherein one or more of the discovery queries specify resource advertisements for network resources within a particular region of the network.

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73. The rendezvous node as recited in claim 48, wherein the program instructions are further executable to:

10 receive a discovery query message from a peer node on the peer-to-peer network specifying a desired type of advertisement, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol;

15 locate one or more advertisements of the desired type of advertisements that are cached on the rendezvous node; and

20 send a response message comprising the one or more advertisements to the peer node in response to said discovery query message, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol.

74. The rendezvous node as recited in claim 48, wherein the program instructions are further operable to:

25 receive a discovery query message from a peer node on the peer-to-peer network specifying a desired type of advertisement, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol; and

30 forward the discovery query message to one or more other rendezvous nodes.

75. The rendezvous node as recited in claim 48, wherein the program instructions are executable to:

5 receive a forwarded discovery query specifying a desired type of advertisement, wherein the discovery query is formatted in accordance with a peer-to-peer platform discovery protocol;

10 locate one or more advertisements of the desired type of advertisement that are cached on the rendezvous node; and

15 send a response message comprising the one or more advertisements to a peer node in response to the forwarded discovery query, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol.

20 76. The rendezvous node as recited in claim 75, wherein the program instructions are further executable to forward the discovery query to one or more other rendezvous nodes on the peer-to-peer network.

77. The rendezvous node as recited in claim 48, wherein the program instructions are further operable to:

25 receive a response message to a discovery query, wherein the discovery query specifies a desired type of advertisement, wherein the response comprises one or more advertisements of the desired type, wherein the response message is formatted in accordance with a peer-to-peer platform discovery protocol; and

forward the response message to a peer node on the peer-to-peer network that sent the discovery query.

78. The rendezvous node as recited in claim 77, wherein the program instructions
5 are further executable to cache for discovery by the plurality of peer nodes the advertisements received in the response message.

79. The rendezvous node as recited in claim 48, wherein the program instructions
are executable to:

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cache advertisements related to a particular area of interest;

receive a discovery query from a peer node on the peer-to-peer network specifying
advertisements related to the particular area of interest;

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if the rendezvous node includes resource advertisements satisfying the received
discovery query, send the resource advertisements to the peer node; and

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forward the received discovery query to other rendezvous nodes on the peer-to-
peer network caching advertisements related to the particular area of
interest.

80. The rendezvous node as recited in claim 48, wherein the program instructions
are further executable to maintain one or more indexes of the resource advertisements
25 cached by the rendezvous node.

81. The rendezvous node as recited in claim 80, wherein the program instructions
are further executable to update the one or more indexes to reflect changes in the network
resources.

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82. The rendezvous node as recited in claim 80, wherein the program instructions are further executable to send the one or more indexes to a service in response to a request from the service, wherein the service is operable to use the indexes to discover network resources advertised in the index.

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83. The rendezvous node as recited in claim 48, wherein the program instructions are further executable to:

receive a lease request message from a peer node of the one or more peer nodes requesting a temporary communications channel between the peer node and the rendezvous node; and

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send a lease grant message to the peer node in response to the lease request message, wherein the lease grant message includes information on the temporary communications channel.

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84. The rendezvous node as recited in claim 83, wherein the program instructions are further executable to:

receive a lease cancel request message from the peer node requesting the cancellation of the temporary communication channel; and

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send a lease cancelled message to the peer node in response to the lease cancel request message, wherein the lease cancelled message confirms the cancellation of the temporary communication channel.

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85. The rendezvous node as recited in claim 83, wherein the program instructions are further executable to:

receive a message from the peer node via the temporary communication channel;

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and

broadcast the message to one or more other peer nodes of the one or more peer
nodes having temporary communications channels with the rendezvous
node.

86. A peer-to-peer network, comprising:

a plurality of peer nodes, wherein each peer node comprises a network node
configured to communicate with one or more other ones of said peer nodes
over the peer-to-peer network;

means for the peer nodes to discover other of the peer nodes;

means for each of the peer nodes to communicate with other of the peer nodes;

means for the peer nodes to form peer groups and sharing network resources in
the peer-to-peer environment;

one or more rendezvous nodes, wherein each rendezvous node comprises a
network node configured to communicate with said plurality of peer
nodes;

means for caching on each rendezvous node one or more resource advertisements
for discovery by the peer nodes on the peer-to-peer network, wherein each
resource advertisement comprises an indication of how to access a
corresponding network resource, wherein said one or more resource
advertisements are formatted in accordance with a peer-to-peer platform
discovery protocol.

87. The peer-to-peer network as recited in claim 86, wherein the network resources include one or more of the peer groups, the peer nodes, services, applications, content, pipes and pipe endpoints, wherein the pipes are communications channels between one or more of the peer nodes, the services and the applications in the peer-to-peer environment, wherein the pipe endpoints are network interfaces on the peer nodes that are configured to be bound to the pipes to establish the communications channels.

88. The peer-to-peer network as recited in claim 86, wherein the one or more resource advertisements comprise a time-to-live indicator, wherein the peer-to-peer network further comprises:

means to decrement the time-to-live indicator;

means to determine if the time-to-live indicator expires; and

means to delete or invalidate the particular cached resource advertisement.

89. The peer-to-peer network as recited in claim 86, further comprising means to discovery routes to network resources and communicate said routes to one or more of the plurality of peer nodes.

90. The peer-to-peer network as recited in claim 86, further comprising means to broadcast discovery queries to discover said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol.

91. The peer-to-peer network as recited in claim 86, further comprising:

means for receiving one or more discovery queries for discovering said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol;

97. The peer-to-peer network as recited in claim 86, further comprising:

5 means for sending a discovery query message specifying a desired type of advertisement to one or more of the rendezvous nodes, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol; and

10 means for receiving one or more response messages comprising one or more advertisements from one or more of the rendezvous nodes in response to said discovery query message, wherein each response message is formatted in accordance with the peer-to-peer platform discovery protocol.

15 98. The peer-to-peer network as recited in claim 97, wherein the discovery query message comprises a time-to-live indicator, wherein the peer-to-peer network further comprises:

means for decrementing the time-to-live indicator; and

20 means for deleting or invalidating the discovery query message if the time-to-live indicator expires.

25 99. The peer-to-peer network as recited in claim 97, wherein the discovery query message comprises a security credential, wherein the peer-to-peer network further comprises means for using the security credential to authenticate the sending peer node.

100. The peer-to-peer network as recited in claim 97, wherein the discovery query message specifies advertisements for network resources within a particular region of the network.

101. The peer-to-peer network as recited in claim 97, further comprising means for caching the advertisements received in the response messages for discovery by the plurality of peer nodes.

102. The peer-to-peer network as recited in claim 86, wherein at least a subset of the one or more rendezvous nodes cache advertisements related to a particular area of interest, wherein the peer-to-peer network further comprises:

means for receiving a discovery query from a peer node specifying advertisements related to the particular area of interest;

means for sending the resource advertisements to the peer node if one of the one or more rendezvous node includes resource advertisements satisfying the received discovery query; and

means for forwarding the received discovery query to rendezvous nodes caching advertisements related to the particular area of interest.

103. The peer-to-peer network as recited in claim 86, further comprising means for maintaining, on one or more of the rendezvous nodes, one or more indexes of the advertisements cached by the rendezvous node.

104. The peer-to-peer network as recited in claim 103, further comprising means for updating the one or more indexes to reflect changes in the network resources.

105. The peer-to-peer network as recited in claim 103, further comprising means for sending the one or more indexes to a service in response to a request from the service, wherein the service is operable to use the indexes to discover network resources advertised in the indexes.

106. The peer-to-peer network as recited in claim 86, further comprising:

means for receiving a lease request message from a peer node of the plurality of
peer nodes requesting a temporary communications channel between the
peer node and a rendezvous node of the one or more rendezvous nodes;
and

means for sending a lease grant message to the peer node in response to the lease
request message, wherein the lease grant message includes information on
the temporary communications channel.

107. The peer-to-peer network as recited in claim 106, further comprising:

means for receiving a lease cancel request message from the peer node requesting
the cancellation of the temporary communication channel; and

means for sending a lease cancelled message to the peer node in response to the
lease cancel request message, wherein the lease cancelled message
confirms the cancellation of the temporary communication channel.

108. The peer-to-peer network as recited in claim 106, further comprising:

means for receiving a message from the peer node via the temporary
communication channel; and

means for broadcasting the message to one or more other peer nodes of the
plurality of peer nodes having temporary communications channels with
the particular rendezvous node.

109. A method, comprising:

5 a plurality of peer nodes on a peer-to-peer network communicating with each other, wherein each peer node comprises a network node configured to communicate with one or more other ones of said peer nodes over the peer-to-peer network,

10 the plurality of peer nodes implementing a peer-to-peer environment on the network according to a peer-to-peer platform comprising a core layer comprising one or more peer-to-peer platform protocols for enabling the plurality of peer nodes to discover each other, communicate with each other, and cooperate with each other to form peer groups and share network resources in the peer-to-peer environment;

15 one or more rendezvous nodes caching one or more resource advertisements for discovery by the peer nodes on the peer-to-peer network, wherein each resource advertisement comprises an indication of how to access a corresponding network resource, wherein the one or more peer-to-peer platform protocols include a discovery protocol, wherein said one or more resource advertisements are formatted in accordance with the peer-to-peer platform discovery protocol.

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110. The method as recited in claim 109, wherein the rendezvous nodes are peer nodes.

25 111. The method as recited in claim 109, wherein each resource advertisement comprises an identifier for and communication address for the corresponding network resource.

30 112. The method as recited in claim 109, wherein each of the one or more of said resource advertisements comprises a security credential, wherein the method further

comprises authenticating a network resource using a security credential comprised by a resource advertisement of the one or more said resource advertisements corresponding to said network resource.

5 113. The method as recited in claim 109, wherein the network resources include one or more of the peer groups, the peer nodes, the rendezvous nodes, services, applications, content, pipes and pipe endpoints, wherein the pipes are communications channels between one or more of the peer nodes, the services and the applications in the peer-to-peer environment, wherein the pipe endpoints are network interfaces on the peer
10 nodes that are configured to be bound to the pipes to establish the communications channels.

114. The method as recited in claim 109, wherein the one or more resource advertisements each comprise a time-to-live indicator, wherein the method further
15 comprises:

a rendezvous node of the one or more rendezvous nodes decrementing the time-to-live indicator comprised by each of the one or more resource advertisement cached by the particular rendezvous node; and

20 the rendezvous node deleting or invalidating the particular cached resource advertisement if the time-to-live indicator expires.

115. The method as recited in claim 109, wherein at least a subset of the peer
25 groups comprise:

one or more of the rendezvous nodes; and

one or more of the plurality of peer nodes;

wherein the method further comprises the one or more peer nodes and the one or more rendezvous nodes within the peer group accessing the other rendezvous nodes within the peer group to discover network resources within the peer group.

5

116. The method as recited in claim 115, wherein the rendezvous nodes within the peer group are not accessible by peer nodes not in the peer group and rendezvous nodes not in the peer group.

10

117. The method as recited in claim 109, further comprising:

the one or more rendezvous nodes discovering routes to network resources; and

the one or more rendezvous nodes communicating said routes to one or more of the plurality of peer nodes.

15

118. The method as recited in claim 109, further comprising one or more of the plurality of peer nodes each communicating with at least one of the one or more rendezvous nodes at startup of the particular peer node to discover network resources that the particular peer node requires.

20

119. The method as recited in claim 109, further comprising each of the plurality of peers broadcasting discovery queries to discover said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol.

25

120. The method as recited in claim 109, further comprising:

each of the one or more rendezvous nodes receiving one or more discovery queries for discovering said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol;

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5

each of the one or more rendezvous nodes determining if a resource advertisement satisfying a particular one of the one or more discovery queries is cached on the particular rendezvous node; and

10

each of the one or more rendezvous nodes providing the resource advertisement to one of the plurality of peer nodes that broadcast the particular discovery query if the resource advertisement satisfying the particular discovery query is cached on the particular rendezvous node.

15

121. The method as recited in claim 120, further comprising each of the one or more rendezvous nodes forwarding the discovery query to one or more other rendezvous nodes if the resource advertisement satisfying the discovery query is not cached on the particular rendezvous node.

20

122. The method as recited in claim 109, further comprising:

each of the plurality of peer nodes receiving one or more discovery queries for discovering said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol;

25

a particular peer node of the plurality of peer nodes responding to a particular one of the one or more discovery queries if the particular peer node includes the resource advertisement satisfying the particular discovery query.

30

123. The method as recited in claim 122, further comprising each of the plurality of peer nodes forwarding the particular discovery query to one or more other peer nodes of the plurality of peer nodes if the particular peer node does not include the resource advertisement satisfying the particular discovery query.

attest that

124. The method as recited in claim 122, further comprising each of the plurality of peer nodes forwarding the particular discovery query to one or more of the rendezvous nodes if the particular peer node does not include the resource advertisement satisfying the particular discovery query.

5

125. The method as recited in claim 122, wherein each of the plurality of peer nodes does not forward the particular discovery query to one or more of the rendezvous nodes if the particular peer node does not include the resource advertisement satisfying the particular discovery query.

10

126. The method as recited in claim 122, further comprising each of the one or more rendezvous nodes forwarding the discovery query to one or more other rendezvous nodes if the resource advertisement satisfying the discovery query is not cached on the particular rendezvous node.

15

127. The method as recited in claim 109, further comprising:

one of the one or more rendezvous nodes receiving a discovery query for discovering a particular one of said network resources, wherein the discovery query is formatted in accordance with the discovery protocol; and

20

the rendezvous node propagating the discovery query to a subset of the one or more rendezvous nodes.

25

128. The method as recited in claim 127, further comprising one or more of the subset of the one or more rendezvous nodes propagating the discovery query to another subset of the one or more rendezvous nodes.

129. The method as recited in claim 128, further comprising limiting propagation of the discovery query using a time-to-live indicator included in the discovery query.

5 130. The method as recited in claim 109, further comprising:

one or more of said peer nodes sending a discovery query message specifying a desired type of advertisement to one or more of the rendezvous nodes, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol; and

one or more of said peer nodes receiving one or more response messages comprising one or more advertisements from one or more of the rendezvous nodes in response to said discovery query message, wherein each response message is formatted in accordance with the peer-to-peer platform discovery protocol.

131. The method as recited in claim 130, wherein the discovery query message comprises a time-to-live indicator, wherein the method further comprises:

the one or more of the rendezvous nodes that receive the discovery query message decrementing the time-to-live indicator; and

the one or more of the rendezvous nodes that receive the discovery query message deleting or invalidating the discovery query message if the time-to-live indicator expires.

132. The method as recited in claim 130, wherein the discovery query message comprises a security credential, wherein the method further comprises the rendezvous nodes using the security credential to authenticate the sending peer node.

133. The method as recited in claim 130, wherein the discovery query message specifies advertisements for network resources within a particular region of the network.

134. The method as recited in claim 109, further comprising:

each of the one or more rendezvous nodes receiving a discovery query message from one of the plurality of peer nodes specifying a desired type of advertisement, wherein the discovery query message is formatted in accordance with the peer-to-peer platform discovery protocol;

each of the one or more rendezvous nodes locating one or more advertisements of the desired type of advertisements that are cached on the particular rendezvous node; and

each of the one or more rendezvous nodes sending a response message comprising the one or more advertisements to the peer node in response to said discovery query message, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol.

135. The method as recited in claim 109, further comprising:

each of the one or more rendezvous nodes receiving a discovery query message from a peer node of the plurality of peer nodes specifying a desired type of advertisement, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol; and

each of the one or more rendezvous nodes forwarding the discovery query message to one or more other rendezvous nodes.

136. The method as recited in claim 135, further comprising:

each of the one or more other rendezvous nodes receiving the forwarded discovery query message;

5 each of the one or more other rendezvous nodes locating one or more advertisements of the desired type of advertisement that are cached on the rendezvous node; and

10 each of the one or more other rendezvous nodes sending a response message comprising the one or more advertisements to the peer node in response to the forwarded discovery query message, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol.
137. The method as recited in claim 135, further comprising:

each of the one or more other rendezvous nodes receiving the forwarded discovery query message; and

20 each of the one or more other rendezvous nodes forwarding the discovery query message to one or more other rendezvous nodes.
138. The method as recited in claim 135, further comprising:

25 each of the one or more rendezvous nodes receiving a response message comprising one or more advertisements from another rendezvous node of the one or more rendezvous nodes, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol; and

30

each of the one or more rendezvous nodes forwarding the response message to a peer node of the plurality of peer nodes that sent the discovery query message.

5 139. The method as recited in claim 138, further comprising each of the one or more rendezvous nodes caching the advertisements received in the response message for discovery by the plurality of peer nodes.

10 140. The method as recited in claim 109, further comprising:

at least a subset of the one or more rendezvous nodes caching advertisements related to a particular area of interest;

15 each of the one or more rendezvous nodes receiving a discovery query from a peer node specifying advertisements related to the particular area of interest;

each of the one or more rendezvous nodes sending the resource advertisements to the peer node if the particular rendezvous node includes resource advertisements satisfying the received discovery query; and

20 each of the one or more rendezvous nodes forwarding the received discovery query to rendezvous nodes caching advertisements related to the particular area of interest.

25 141. The method as recited in claim 109, further comprising the rendezvous nodes maintaining one or more indexes of the advertisements cached by the rendezvous node.

30 142. The method as recited in claim 141, further comprising the rendezvous nodes updating the one or more indexes to reflect changes in the network resources.

143. The method as recited in claim 141, further comprising:

each of the one or more rendezvous nodes sending the one or more indexes to a
5 service in response to a request from the service; and

the service using the indexes to discover network resources advertised in the
indexes.

10 144. The method as recited in claim 109, further comprising:

each of the one or more rendezvous nodes receiving a lease request message from
a peer node of the plurality of peer nodes requesting a temporary
communications channel between the peer node and the particular
15 rendezvous node; and

the particular rendezvous node sending a lease grant message to the peer node in
response to the lease request message, wherein the lease grant message
includes information on the temporary communications channel.

20 145. The method as recited in claim 109, further comprising:

the particular rendezvous node receiving a lease cancel request message from the
peer node requesting the cancellation of the temporary communication
25 channel; and

the particular rendezvous node sending a lease cancelled message to the peer node
in response to the lease cancel request message, wherein the lease
cancelled message confirms the cancellation of the temporary
30 communication channel.

Attorney for Plaintiff

146. The method as recited in claim 109, further comprising:

the particular rendezvous node receiving a message from the peer node via the
temporary communication channel; and

the particular rendezvous node broadcasting the message to one or more other
peer nodes of the plurality of peer nodes having temporary
communications channels with the particular rendezvous node.

147. A method, comprising:

a rendezvous node communicating with one or more peer nodes on a peer-to-peer
network, and

a rendezvous node caching one or more resource advertisements for network
resources, wherein each of said resource advertisements comprises an
indication of how to access the corresponding network resource; and

one or more peer nodes discovering said resource advertisements.

148. The method as recited in claim 147, further comprising a rendezvous node
communicating with one or more other rendezvous nodes on the peer-to-peer network.

149. The method as recited in claim 147, wherein the network resources include
one or more peer groups, wherein the one or more peer groups each comprise one or more
peer nodes sharing one or more network resources, one or more peer nodes, services,
applications, content, pipes and pipe endpoints, wherein the pipes are communications
channels between one or more of the peer nodes, the services and the applications in the
peer-to-peer environment, wherein the pipe endpoints are network interfaces on the peer

nodes that are configured to be bound to the pipes to establish the communications channels.

150. The method as recited in claim 147, further comprising:

5

generating a resource advertisement for the rendezvous node; and

the rendezvous node communicating said resource advertisement to peer nodes
and other rendezvous nodes for discovery on the peer-to-peer network.

10

151. The method as recited in claim 147, further comprising the rendezvous node
joining a peer group, wherein the peer group comprises a plurality of peer nodes sharing
network resources, wherein, upon joining the peer group, the rendezvous node is
accessible by the one or more peer nodes within the peer group to discover network
resources within the peer group.

15

152. The method as recited in claim 151, wherein, upon joining the peer group,
the rendezvous node is not accessible by peer nodes not in the peer group.

20

153. The method as recited in claim 147, further comprising:

the rendezvous node receiving one or more discovery queries for discovering said
network resources, wherein the discovery queries are formatted in
accordance with a discovery protocol;

25

the rendezvous node determining if a resource advertisement satisfying a
particular one of the one or more discovery queries is cached on the
particular rendezvous node; and

the rendezvous node, providing the resource advertisement to a peer node that broadcast the particular discovery query if the resource advertisement satisfying the particular discovery query is cached on the particular rendezvous node.

5

154. The method as recited in claim 153, further comprising forwarding each of the one or more discovery queries to one or more other rendezvous nodes on the peer-to-peer network if the resource advertisement satisfying the particular discovery query is not cached on the rendezvous node.

10

155. The method as recited in claim 154, further comprising:

the rendezvous node receiving a response message to a discovery query, wherein the discovery query specifies a desired type of advertisement, wherein the response comprises one or more advertisements of the desired type, wherein the response message is formatted in accordance with a peer-to-peer platform discovery protocol; and

15

the rendezvous node forwarding the response message to a peer node on the peer-to-peer network that sent the discovery query.

20

156. The method as recited in claim 155, further comprising the rendezvous node caching the advertisements received in the response message for discovery by the plurality of peer nodes.

25

157. The method as recited in claim 147, further comprising:

the rendezvous node receiving a lease request message from a peer node of the one or more peer nodes requesting a temporary communications channel between the peer node and the rendezvous node; and

30

the rendezvous node sending a lease grant message to the peer node in response to the lease request message, wherein the lease grant message includes information on the temporary communications channel.

5

158. The method as recited in claim 157, further comprising:

the rendezvous node receiving a lease cancel request message from the peer node requesting the cancellation of the temporary communication channel; and

10

the rendezvous node sending a lease cancelled message to the peer node in response to the lease cancel request message, wherein the lease cancelled message confirms the cancellation of the temporary communication channel.

15

159. The method as recited in claim 157, further comprising:

the rendezvous node receiving a message from the peer node via the temporary communication channel; and

20

the rendezvous node broadcasting the message to one or more other peer nodes of the one or more peer nodes having temporary communications channels with the rendezvous node.

25

160. An article of manufacture comprising program instructions, wherein the program instructions are computer-executable to implement:

a plurality of peer nodes on a peer-to-peer network communicating with each other, wherein each peer node comprises a network node configured to

communicate with one or more other ones of said peer nodes over the peer-to-peer network,

the plurality of peer nodes implementing a peer-to-peer environment on the network according to a peer-to-peer platform comprising a core layer comprising one or more peer-to-peer platform protocols for enabling the plurality of peer nodes to discover each other, communicate with each other, and cooperate with each other to form peer groups and share network resources in the peer-to-peer environment;

one or more rendezvous nodes caching one or more resource advertisements for discovery by the peer nodes on the peer-to-peer network, wherein each resource advertisement comprises an indication of how to access a corresponding network resource, wherein the one or more peer-to-peer platform protocols include a discovery protocol, wherein said one or more resource advertisements are formatted in accordance with the peer-to-peer platform discovery protocol.

161. The article of manufacture as recited in claim 160, wherein the rendezvous nodes are peer nodes.

162. The article of manufacture as recited in claim 160, wherein each resource advertisement comprises an identifier for and communication address for the corresponding network resource.

163. The article of manufacture as recited in claim 160, wherein each of the one or more of said resource advertisements comprises a security credential, wherein the method further comprises authenticating a network resource using a security credential comprised by a resource advertisement of the one or more said resource advertisements corresponding to said network resource.

164. The article of manufacture as recited in claim 160, wherein the network resources include one or more of the peer groups, the peer nodes, the rendezvous nodes, services, applications, content, pipes and pipe endpoints, wherein the pipes are communications channels between one or more of the peer nodes, the services and the applications in the peer-to-peer environment, wherein the pipe endpoints are network interfaces on the peer nodes that are configured to be bound to the pipes to establish the communications channels.

165. The article of manufacture as recited in claim 160, wherein the one or more resource advertisements each comprise a time-to-live indicator, wherein the program instructions are further executable to implement:

a rendezvous node of the one or more rendezvous nodes decrementing the time-to-live indicator comprised by each of the one or more resource advertisement cached by the particular rendezvous node; and

the rendezvous node deleting or invalidating the particular cached resource advertisement if the time-to-live indicator expires.

166. The article of manufacture as recited in claim 160, wherein at least a subset of the peer groups comprise:

one or more of the rendezvous nodes; and

one or more of the plurality of peer nodes;

wherein the program instructions are further executable to implement the one or more peer nodes and the one or more rendezvous nodes within the peer

group accessing the other rendezvous nodes within the peer group to discover network resources within the peer group.

167. The article of manufacture as recited in claim 166, wherein the rendezvous
5 nodes within the peer group are not accessible by peer nodes not in the peer group and rendezvous nodes not in the peer group.

168. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

10

the one or more rendezvous nodes discovering routes to network resources; and

the one or more rendezvous nodes communicating said routes to one or more of the plurality of peer nodes.

15

169. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement one or more of the plurality of peer nodes each communicating with at least one of the one or more rendezvous nodes at startup of the particular peer node to discover network resources that the particular peer
20 node requires.

170. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement each of the plurality of peers broadcasting discovery queries to discover said network resources, wherein the discovery
25 queries are formatted in accordance with the discovery protocol.

171. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

each of the one or more rendezvous nodes receiving one or more discovery queries for discovering said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol;

5 each of the one or more rendezvous nodes determining if a resource advertisement satisfying a particular one of the one or more discovery queries is cached on the particular rendezvous node; and

10 each of the one or more rendezvous nodes providing the resource advertisement to one of the plurality of peer nodes that broadcast the particular discovery query if the resource advertisement satisfying the particular discovery query is cached on the particular rendezvous node.

15 172. The article of manufacture as recited in claim 171, wherein the program instructions are further executable to implement each of the one or more rendezvous nodes forwarding the discovery query to one or more other rendezvous nodes if the resource advertisement satisfying the discovery query is not cached on the particular rendezvous node.

20 173. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

25 each of the plurality of peer nodes receiving one or more discovery queries for discovering said network resources, wherein the discovery queries are formatted in accordance with the discovery protocol;

30 a particular peer node of the plurality of peer nodes responding to a particular one of the one or more discovery queries if the particular peer node includes the resource advertisement satisfying the particular discovery query.

174. The article of manufacture as recited in claim 173, wherein the program instructions are further executable to implement each of the plurality of peer nodes forwarding the particular discovery query to one or more other peer nodes of the plurality of peer nodes if the particular peer node does not include the resource advertisement
 5 satisfying the particular discovery query.

175. The article of manufacture as recited in claim 173, wherein the program instructions are further executable to implement each of the plurality of peer nodes forwarding the particular discovery query to one or more of the rendezvous nodes if the
 10 particular peer node does not include the resource advertisement satisfying the particular discovery query.

176. The article of manufacture as recited in claim 173, wherein each of the plurality of peer nodes does not forward the particular discovery query to one or more of
 15 the rendezvous nodes if the particular peer node does not include the resource advertisement satisfying the particular discovery query.

177. The article of manufacture as recited in claim 173, wherein the program instructions are further executable to implement each of the one or more rendezvous
 20 nodes forwarding the discovery query to one or more other rendezvous nodes if the resource advertisement satisfying the discovery query is not cached on the particular rendezvous node.

178. The article of manufacture as recited in claim 160, wherein the program
 25 instructions are further executable to implement:

one of the one or more rendezvous nodes receiving a discovery query for
 discovering a particular one of said network resources, wherein the
 discovery query is formatted in accordance with the discovery protocol;
 30 and

the rendezvous node propagating the discovery query to a subset of the one or more rendezvous nodes.

5 179. The article of manufacture as recited in claim 178, wherein the program instructions are further executable to implement limiting propagation of the discovery query using a time-to-live indicator included in the discovery query.

10 180. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

15 one or more of said peer nodes sending a discovery query message specifying a desired type of advertisement to one or more of the rendezvous nodes, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol; and

20 one or more of said peer nodes receiving one or more response messages comprising one or more advertisements from one or more of the rendezvous nodes in response to said discovery query message, wherein each response message is formatted in accordance with the peer-to-peer platform discovery protocol.

25 181. The article of manufacture as recited in claim 180, wherein the discovery query message comprises a time-to-live indicator, wherein the program instructions are further executable to implement:

the one or more of the rendezvous nodes that receive the discovery query message decrementing the time-to-live indicator; and

the one or more of the rendezvous nodes that receive the discovery query message deleting or invalidating the discovery query message if the time-to-live indicator expires.

5 182. The article of manufacture as recited in claim 180, wherein the discovery query message comprises a security credential, wherein the program instructions are further executable to implement the rendezvous nodes using the security credential to authenticate the sending peer node.

10 183. The article of manufacture as recited in claim 180, wherein the discovery query message specifies advertisements for network resources within a particular region of the network.

15 184. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

each of the one or more rendezvous nodes receiving a discovery query message from one of the plurality of peer nodes specifying a desired type of advertisement, wherein the discovery query message is formatted in accordance with the peer-to-peer platform discovery protocol;

20

each of the one or more rendezvous nodes locating one or more advertisements of the desired type of advertisements that are cached on the particular rendezvous node; and

25

each of the one or more rendezvous nodes sending a response message comprising the one or more advertisements to the peer node in response to said discovery query message, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol.

30

185. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

5 each of the one or more rendezvous nodes receiving a discovery query message from a peer node of the plurality of peer nodes specifying a desired type of advertisement, wherein the discovery query message is formatted in accordance with a peer-to-peer platform discovery protocol; and

10 each of the one or more rendezvous nodes forwarding the discovery query message to one or more other rendezvous nodes.

186. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

15 each of the one or more other rendezvous nodes receiving the forwarded discovery query message;

20 each of the one or more other rendezvous nodes locating one or more advertisements of the desired type of advertisement that are cached on the rendezvous node; and

25 each of the one or more other rendezvous nodes sending a response message comprising the one or more advertisements to the peer node in response to the forwarded discovery query message, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol.

187. The article of manufacture as recited in claim 186, wherein the program instructions are further executable to implement:

each of the one or more other rendezvous nodes receiving the forwarded discovery query message; and

each of the one or more other rendezvous nodes forwarding the discovery query message to one or more other rendezvous nodes.

188. The article of manufacture as recited in claim 186, wherein the program instructions are further executable to implement:

each of the one or more rendezvous nodes receiving a response message comprising one or more advertisements from another rendezvous node of the one or more rendezvous nodes, wherein the response message is formatted in accordance with the peer-to-peer platform discovery protocol; and

each of the one or more rendezvous nodes forwarding the response message to a peer node of the plurality of peer nodes that sent the discovery query message.

189. The article of manufacture as recited in claim 188, wherein the program instructions are further executable to implement each of the one or more rendezvous nodes caching the advertisements received in the response message for discovery by the plurality of peer nodes.

190. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement:

at least a subset of the one or more rendezvous nodes caching advertisements related to a particular area of interest;

each of the one or more rendezvous nodes receiving a discovery query from a peer node specifying advertisements related to the particular area of interest;

each of the one or more rendezvous nodes sending the resource advertisements to the peer node if the particular rendezvous node includes resource advertisements satisfying the received discovery query; and

each of the one or more rendezvous nodes forwarding the received discovery query to rendezvous nodes caching advertisements related to the particular area of interest.

191. The article of manufacture as recited in claim 160, wherein the program instructions are further executable to implement the rendezvous nodes maintaining one or more indexes of the advertisements cached by the rendezvous node.

192. The article of manufacture as recited in claim 191, wherein the program instructions are further executable to implement the rendezvous nodes updating the one or more indexes to reflect changes in the network resources.

193. The article of manufacture as recited in claim 191, wherein the program instructions are further executable to implement:

each of the one or more rendezvous nodes sending the one or more indexes to a service in response to a request from the service; and

the service using the indexes to discover network resources advertised in the indexes.

194. An article of manufacture comprising program instructions, wherein the program instructions are computer-executable to implement:

a rendezvous node communicating with one or more peer nodes on a peer-to-peer network, and

5 a rendezvous node caching one or more resource advertisements for network resources, wherein each of said resource advertisements comprises an indication of how to access the corresponding network resource; and

one or more peer nodes discovering said resource advertisements.

10

195. The article of manufacture as recited in claim 194, wherein the program instructions are further executable to implement a rendezvous node communicating with one or more other rendezvous nodes on the peer-to-peer network.

15

196. The article of manufacture as recited in claim 194 wherein the network resources include one or more peer groups, wherein the one or more peer groups each comprise one or more peer nodes sharing one or more network resources, one or more peer nodes, services, applications, content, pipes and pipe endpoints, wherein the pipes are communications channels between one or more of the peer nodes, the services and the applications in the peer-to-peer environment, wherein the pipe endpoints are network interfaces on the peer nodes that are configured to be bound to the pipes to establish the communications channels.

20

197. The article of manufacture as recited in claim 194, wherein the program instructions are further executable to implement:

25

generating a resource advertisement for the rendezvous node; and

the rendezvous node communicating said resource advertisement to peer nodes and other rendezvous nodes for discovery on the peer-to-peer network.

30

198. The article of manufacture as recited in claim 194, wherein the program instructions are further executable to implement the rendezvous node joining a peer group, wherein the peer group comprises a plurality of peer nodes sharing network resources, wherein, upon joining the peer group, the rendezvous node is accessible by the one or more peer nodes within the peer group to discover network resources within the peer group.

199. The article of manufacture as recited in claim 198, wherein, upon joining the peer group, the rendezvous node is not accessible by peer nodes not in the peer group.

200. The article of manufacture as recited in claim 194, wherein the program instructions are further executable to implement:

the rendezvous node receiving one or more discovery queries for discovering said network resources, wherein the discovery queries are formatted in accordance with a discovery protocol;

the rendezvous node determining if a resource advertisement satisfying a particular one of the one or more discovery queries is cached on the particular rendezvous node; and

the rendezvous node, providing the resource advertisement to a peer node that broadcast the particular discovery query if the resource advertisement satisfying the particular discovery query is cached on the particular rendezvous node.

201. The article of manufacture as recited in claim 200, wherein the program instructions are further executable to implement forwarding each of the one or more discovery queries to one or more other rendezvous nodes on the peer-to-peer network if

the resource advertisement satisfying the particular discovery query is not cached on the rendezvous node.

202. The article of manufacture as recited in claim 201, wherein the program
5 instructions are further executable to implement:

the rendezvous node receiving a response message to a discovery query, wherein
the discovery query specifies a desired type of advertisement, wherein the
response comprises one or more advertisements of the desired type,
10 wherein the response message is formatted in accordance with a peer-to-
peer platform discovery protocol; and

the rendezvous node forwarding the response message to a peer node on the peer-
to-peer network that sent the discovery query.

203. The article of manufacture as recited in claim 202, wherein the program
instructions are further executable to implement the rendezvous node caching the
advertisements received in the response message for discovery by the plurality of peer
nodes.